

**KECHIKA ENHANCEMENT PROJECT
OF NORTHEASTERN BRITISH COLUMBIA
WOLF/UNGULATE MANAGEMENT
1985-86 ANNUAL REPORT**



Ministry of Environment and Parks
Fort St. John, B.C.

Wildlife Working Report No. WR-20
July 1986

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by

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ABSTRACT

This report covers work completed for the Kechika wolf management program for the 1985 - 86 biological year. Wolves have increased threefold since the termination of management. Ungulate juvenile survival was generally good over summer and then declined thereafter as wolves immigrated to the Kechika. High juvenile summer survival only partially buffered adult ungulate winter losses to wolves. The Blue Jennings, an area of continuously unmanaged wolf numbers, showed a further increase in wolf pack size to over 9 wolves per average pack. Juvenile ungulate survivals were much poorer than the Kechika even with wolves rebuilding there.

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INTRODUCTION

The numbers of ungulates in northeast British Columbia have undergone devastating declines. Of the three species that were most abundant in the early seventies, caribou have crashed by some 75% or 7500 animals (Bergerud 1978), moose by 80% or 90 000 animals (Elliott 1986), and mountain sheep by 50% or 7000 animals (Elliott 1985a). These declines have been a direct consequence of the low survival of juveniles resulting from high predation, particularly by wolves.

The Ministry of Environment finalized a program design (Elliott 1984a) in 1984 to bring wolf and prey populations into balance for the Kechika portion of the northeast (Figure 1). This program aimed at maintaining wolf numbers at 1 per 260 - 390 km² (1 per 100 - 150 sq. mi.) while ungulate herds recovered. Following dramatic positive response in juvenile ungulate survival, the program was halted in 1985.

This report provides wildlife status in the Kechika for the 1985/86 period. The project area is described in Elliott and Webster (1982) and Elliott et al. (1984).

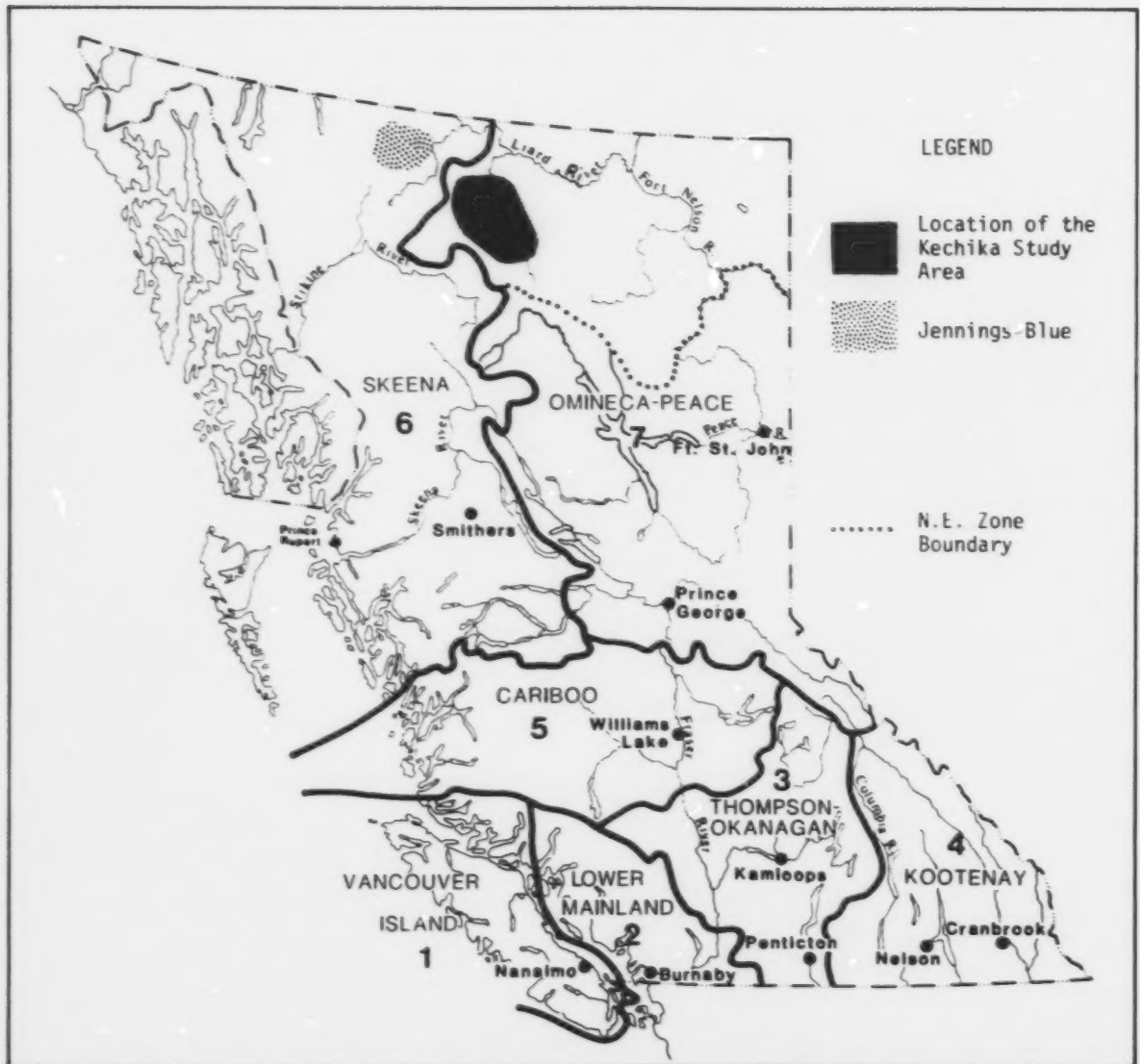


Figure 1. Map of British Columbia showing the location of areas referred to in the text and the zonal NE administration boundary.

METHODS

WOLF SURVEYS

Wolves were inventoried from a Bell 206 helicopter by flying likely wolf travel routes until fresh sign was located. The trail sign was then followed until either the wolves were seen or the tracks separated sufficiently to enable a count. When necessary, track counts were confirmed by landing and examining the sign in detail.

MOOSE AND ELK SURVEYS

Transects were flown in the autumn and late winter periods to estimate the age and adult sex ratios of moose. Transects were uniformly spaced straight lines (modified where necessary for feasibility in rough topography) and predetermined on 1:250 000 scale maps. This sampling pattern was assumed to be random relative to moose distribution. In the autumn, moose were classified as calf, yearling male, adult male, or non-calf female based upon size, presence or absence of antlers, and antler configuration. In winter, they were classified as to calf, non-calf male, or non-calf female based upon shape, size, presence or absence of white vulval hair, head colouration, and presence or absence of antler scars. The proportion of yearlings (both sexes) was estimated by doubling the number of yearling males classified, thus assuming a 50:50 sex ratio.

Autumn transects were flown by helicopter, as were late winter transects. The proportion of the total moose population seen was not measured, but it was assumed that there was no visibility bias for the different age/sex categories, except as noted in the results.

MOUNTAIN SHEEP SURVEYS

All mountain sheep habitat types over differing elevations and aspects were searched as discrete mountain units in an attempt to locate all adult females and juveniles per unit. Juveniles were classified as either 9 months or 21 months old. The wide distribution and smaller group sizes of males made it impractical to aim for a total count for this component outside the ewe-juvenile areas.

Mountain sheep were inventoried using a Bell 206 helicopter on clear, calm days, with temperatures around -20°C. This machine was equipped with bubble windows in the rear and an internal communication system. Speed and

closeness were varied so that both observers were placed optimally according to the visibility. Upon locating a group, the helicopter approached slowly, usually from slightly below or behind the sheep, while the observers obtained a total count. Particularly where the sheep were in open terrain, the approach usually caused them to move upslope in a line or separate into small groups facilitating classification. In rough terrain, the sheep tended to group together and a close (20 to 30 m), slow approach was required to separate them for classification. Where large groups of sheep were encountered, they were classified from the ground using a spotting scope. In the event fresh sign was observed and sheep were not located, local searching intensity was increased until the group was located. The openness of most of the ranges plus snow cover made this a useful technique.

DATA ANALYSIS

Sex and age composition data were expressed as ratios (number per 100 females) or as percentages of the total. The recruitment rate was defined as the proportion of a population of a given age or older, for one or both sexes, which that given age group comprises. Finite rates of population change (λ) can be calculated from the equation

$$\lambda = \frac{1-M}{1-R}$$

where R is the recruitment rate and M is the mortality rate for the animals of greater age than the recruitment age. $(\lambda-1)*100$ yields the percent population growth.

RESULTS

WOLF SURVEY

Figure 2 and Table 1 summarize the 1986 late winter wolf numbers for the Kechika. The total area surveyed was 16 810 km² (6490 sq. mi.) and was found to include some 212 wolves in 44 packs (grouping of two or more wolves) and 3 singles. This converts to an average of 1 wolf per 79 km² (30 sq. mi. per wolf) and 4.8 wolves per pack.

Twelve months previously, following wolf population management, the Kechika had one wolf per 216 km² (84 sq. mi.). The threefold increase within one year in the small reduction area results largely from immigration from surrounding high wolf density areas (Elliott 1985b, c).

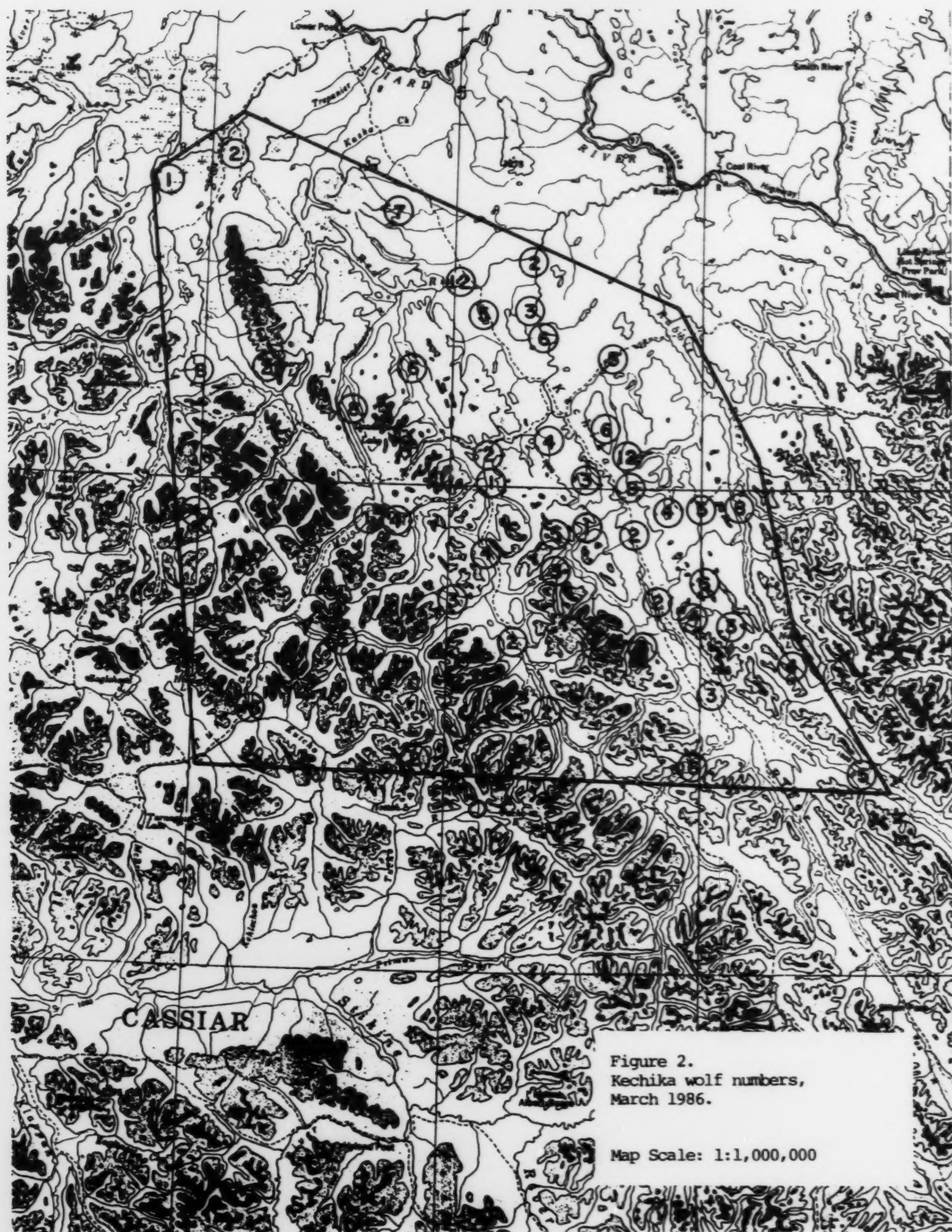


Figure 2.
Kechika wolf numbers,
March 1986.

Map Scale: 1:1,000,000

Figure 3 and Table 2 summarize the 1986 late winter wolf numbers for the Blue Jennings. This 6500 km² (2500 sq. mi.) area of unmanaged wolf numbers and lower prey biomass had 101 wolves or 1 wolf per 64 km² (25 sq. mi.). The 1985 density was similar (Elliott 1985b). Mean unmanaged pack size for the area continued the steady annual increase from 5.8 wolves per pack in 1982 to 9.1 in 1986. This is twice the present average pack size for the wolf population rebuilding in the Kechika.

MOOSE SURVEY

Table 3 indicates fall moose proportions for the Kechika. As in past years with late winter management of wolf numbers (Elliott 1985b), the survival of calves to autumn is high with 57 calves per 100 adult cows. This can be contrasted to moose survival in the unmanaged wolf Blue Jennings (Table 4) where there were only 12 calves per 100 adult cows at that time.

Yearling survival to autumn in the Kechika (Table 3) with 46 remaining per 100 cows was good. In contrast, of 144 moose observed in the Blue Jennings (Table 4), no yearling bulls (thus zero total yearlings calculated) were observed.

Table 5 indicates moose proportions in late winter for the Kechika. By that time, calves had declined to 42 per 100 cows. In the Blue Jennings (Table 6), calves had declined to 4 per 100 cows. With winter wolf management, calf ratios did not decline between fall and late winter (Elliott 1985b).

MOUNTAIN SHEEP SURVEY

Table 7 presents the results of the late winter mountain sheep survey for the Kechika. This survey enumerated over 1500 female and juvenile mountain sheep and found 43.3 lambs and 19.3 yearlings per 100 ewes. The Blue Jennings in contrast (Table 8) had only half (23.5) the number of lambs and one-third (7.1) the number of yearlings per 100 ewes.

CARIBOU SURVEYS

Table 9 presents the results of the fall (rut) caribou survey of the Horseranch Range. At that time there were 51 calves per 100 cows (1+-years) and calf recruitment was 26%. Farnell (pers. comm.) reports that the Little Rancheria caribou (N=244) of the Blue Jennings had, in October 1985, 28 calves per 100 adult cows (2+-years; thus the ratio would be lower for 1+-year cows). Calf survival over summer on the low wolf Horseranch Range was therefore twice as high as that of the high wolf Blue Jennings.

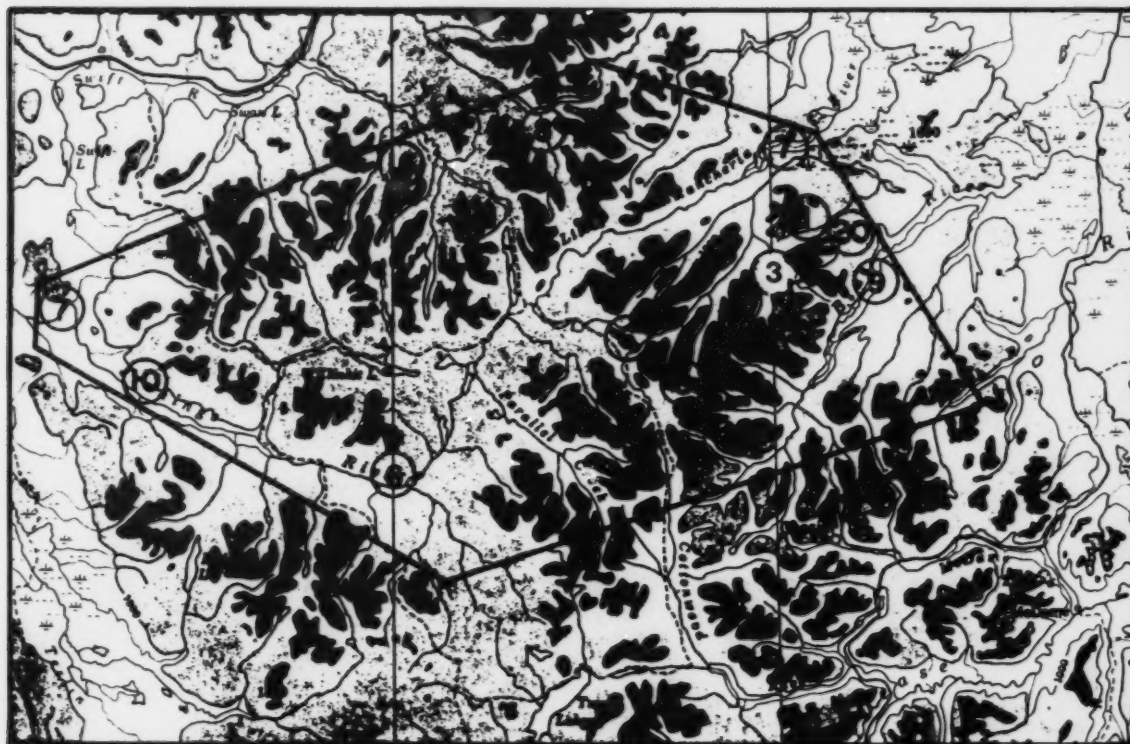


Figure 3.
Blue Jennings wolf numbers,
March 1986.

Map Scale: 1:1,000,000

ELK SURVEYS

Thirty-five cows were encountered in the October elk survey (Table 10). These were accompanied by 25 calves, a 71 per 100 cow ratio. Twenty-two cows were encountered in an early February survey (Table 11). Eight calves were with these cows, a 36 per 100 cow ratio.

The absolute sample sizes were small for these two surveys. However, they represent about half of the cows in the population, thus the proportion is high. It appears that there was a substantial calf loss between fall and mid-winter. The main cow elk area was hunted by some 29 wolves over winter and 6 freshly killed (by wolves) elk were seen during the course of winter surveys.

WEATHER

Winter weather conditions were mild. April 1 water equivalent snowpack for Dease Lake (Water Management Branch, Province of B.C.) was only 80% of the 21-year average.

Table 1. Wolf status in the Kechika Program Area - March, 1986.

Parameter	Value
Survey area	16 810 km ² (6490 mi ²)
Number of wolves	212
Number of wolf packs	44 + 3 singles
Wolf density	1/79 km ² (1/30 mi ²)
Pack density	1/382 km ² (1/147 mi ²)
Wolves per pack	4.8

Table 2. Wolf status in the Blue Jennings Area - March, 1986.

Parameter	Value
Survey area	6500 km ² (2500 mi ²)
Number of wolves	101
Number of wolf packs	11 + 1 singles
Wolf density	1/64 km ² (1/25 mi ²)
Pack density	1/650 km ² (1/250 mi ²)
Wolves per pack	9.1

Table 3. Moose proportions in the Kechika, October 1985.

Category	Number	Proportions	
		No. Per 100 Cows (2+ Years)	% of Total
Adult cows (2+ years)	134		42
Adult bulls (2+ years)	46	34	14
Yearlings ^a	62	46	19
Calves	<u>77</u>	57	24
	319		

^a Assumes a 50:50 sex ratio

Table 4. Moose proportions in the Blue Jennings, October 1986.

Category	Number	Proportions	
		No. Per 100 Cows (2+ Years)	% of Total
Adult cows (2+ years)	76		53
Adult bulls (2+ years)	59	78	41
Yearlings ^a	0	0	0
Calves	<u>9</u>	12	6
	144		

^a Assumes a 50:50 sex ratio

Table 5. Moose proportions^a in the Kechika, March 1986.

Category	Number	No. Per 100 Cows (2+ Years)
Adult cows (2+ years)	127	
Adult bulls (2+ years)	53	42
Calves	<u>52</u>	41
	232	

^a Assumes yearling ratio by sex unchanged from autumn

Table 6. Moose proportions^a in the Blue Jennings, March 1986.

Category	Number	No. Per 100 Cows (2+ Years)
Adult cows (2+ years)	68	
Adult bulls (2+ years)	53	78
Calves	<u>3</u>	4
	124	

^a Assumes yearling ratio by sex unchanged from autumn

Table 7. Mountain sheep juvenile proportions in the Kechika,
February - March 1986.

Category	Number	Number Per 100 Ewes (2+ Years)
Ewes (2+ years)	941	
Lambs	407	43
Yearlings	<u>182</u>	19
	1530	

Table 8. Mountain sheep juvenile proportions in the Blue Jennings,
March 1986.

Category	Number	Number Per 100 Ewes (2+ Years)
Ewes (2+ years)	98	
Lambs	23	23
Yearlings	<u>7</u>	7
	128	

Table 9. Horseranch Range caribou, October 1985.

Category	Number	Number Per 100 Cows	% of Total
Cows (1+ Years)	63		51
Bulls (1+ Years)	140	45	23
Calves	<u>71</u>	51	26
	274		

Table 10. Elk juvenile proportions in the Kechika, October 1985.

Category	Number	No. Per 100 Cows (2+ Years)
Cows	35	
Calves	<u>25</u>	71
	60	

Table 11. Elk juvenile proportions in the Kechika, February 1986.

Category	Number	No. Per 100 Cows (2+ Years)
Cows	22	
Calves	<u>8</u>	36
	30	

DISCUSSION

Wildlife response to the termination of managing wolves was generally in line with what would be expected from the response to managing wolves (Elliott 1985b, c). Wolves rebounded in numbers threefold within 12 months. This increase would be primarily as a result of immigration from surrounding high wolf density areas (Elliott 1985b, c). This immigration occurs most particularly in the autumn and early winter (Elliott and Webster 1982). With ongoing management of wolf numbers, their numbers were reduced through the winter such that higher wolf numbers were present for only a short period in early winter. This of course did not occur with wolf management terminated. All of the fall surveys (caribou plus fall elk and moose) measure survival over a low wolf density interval, while late winter surveys measure survival over a low wolf density summer plus a moderate wolf density winter.

The period between the autumn and late winter moose surveys was about 130 days. This would yield 27 560 wolf days (212 wolves x 130 days) of food consumption for the Kechika. Carbyn (1983) found for a rich multiprey system, that the winter food consumption rate by wolves was 0.21 kg of prey per kg of wolf per day. At about 42 kg (92 lbs.) per wolf (Elliott et al., in prep.), this yields 8.8 kg (19.4 lbs.) of food consumed per day per wolf. Thus for the 27 560 wolf days (1/3 of a year) in the Kechika between fall and late winter moose surveys, the Kechika wolves would be expected to have consumed 242 528 kg (534 682 lbs.) of meat. Carbyn (1983) found, however, that of the edible (to wolves) portion of a wolf-killed moose, scavengers (ravens, coyotes...) ate an amount equivalent to 87% of what the wolves ate, or 210 999 kg. (465 174 lbs.). Assuming that 75% by weight of a carcass is consumable (Peterson 1977), the wolves would therefore have had to kill 604 703 kg (1 333 142 lbs.) liveweight of moose for their own consumption and for meat left to scavengers.

The Kechika moose calf loss between fall and late winter could not provide the wolves' food needs as calculated, let alone a portion for scavengers. The density of moose for the Kechika is on the order of 0.5/km² (Elliott et al. 1984; Elliott 1984b) yielding 8405 moose or, at 42% cows, 3530 cows. If no cows were lost there would have been 2012 calves in fall (Table 3) and 1483 calves in late winter (Table 5) for a loss of 529 calves. At 150 kg (330 lbs.) liveweight (Franzmann et al. 1978) and 75% or 112 kg (248 lbs.) edible to wolves weight (Peterson 1977), these calves could have provided, even with no scavenger loss, 59 248 kg (130 619 lbs.) or only 24% of the wolves' expected consumption requirement during that third of the year.

Two options were available to supply the remainder of the wolves' needs: other species or adult moose. The immigrant wolves would have come from basically moose only areas and so they would have been oriented to moose killing. It appears (Table 7) that the loss of mountain sheep was not extreme so the transition to the necessary mountain sheep killing

skills apparently did not occur in large measure this first winter. Regardless, given the small size of mountain sheep, even a few hundred would provide but little to the wolves' food requirement. In contrast to mountain sheep, a lack of killing experience by the wolves did not save the elk (as expected from the similar killing skills necessary) and the kill of these was substantial, however their small numbers could have provided no more than a tiny proportion of the wolves' considerable food needs. Caribou are available to only a small portion of the Kechika wolves. In consequence then, a number of adult moose would also have had to be killed by the wolves to provide for even their, let alone scavenger, consumption.

The Blue Jennings has not had the benefit of even a summer of lower wolf density. Further, while winter wolf densities were not markedly different, the steady decline of game herds (from years of unmanaged predation) in the Blue Jennings has resulted in the prey-to-wolf ratio being smaller than in the Kechika. The effect of the longer period of uncontrolled predation by wolves and the smaller prey: wolf ratio shows in poorer recruitment for moose, mountain sheep, and caribou.

CONCLUSION

The termination of wolf management in the Kechika has quickly resulted in a shift in the wolf/prey balance. Moose and elk at the least have in consequence shown substantially poorer survival than would have been expected with ongoing wolf management. Low wolf numbers over summer (resulting from wolf management the previous winter) and consequent high summer moose, elk, and caribou juvenile survival, did considerably ameliorate overall loss for the year. Furthermore limited switching to mountain sheep perhaps because of the immigrant wolves inexperience at killing such prey, did allow satisfactory survival for that species.

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